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COAL BEDS IN WASHINGTON COUNTY, PENNSYLVANIA

By

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Introduction.

Washington County has been one of the most important coal producers in Pennsylvania for many years. It contains approximately 40 percent of the Pittsburgh coal reserves in the State. Several coal beds, besides the Pittsburgh, are mineable and can be expected to maintain the large output when the thicker and more easily accessible coal has been exhausted. Some of the beds above the Pittsburgh coal are now being mined, but development has not reached the beds lying below that coal, because they are at great depth and little is known of their quality or persistence.

In 1918 Washington County stood third in Pennsylvania as a bituminous coal producer, being excelled only by Fayette and Westmoreland counties. The county produced 23,537,263 tons of coal, valued at \$57,968,881, and distributed as follows: 21,369,814 tons loaded at the mines for shipment; 435,417 tons used at the mines for steam and heat; 340,838 tons made into coke at the mines.

There are thirty coal beds in the county, many of which are only a few inches thick, and eight are locally workable. The Pittsburgh bed is the most persistent and important coal in Washington County. The Waynesburg and Washington beds are greatly valued as producers of domestic coal; the Redstone bed is also locally workable.

Washington County, situated in the southwestern part of the State, is bounded on the north by Beaver County, on the northeast by Allegheny County, on the east by Westmoreland and Fayette counties,



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on the south by Greene County and on the west by the State of Ohio. Its greatest width from north to south is  $37\frac{1}{2}$  miles, and from east to west 38 miles. Its area is 890 square miles. The population in 1920 was 188,992.

Washington County has ample transportation facilities, both by water and rail. The Monongahela division of the Pennsylvania Railroad follows the west bank of Monongahela River along the eastern border of the county; a branch of this division runs southwest from Monongahela City to Marianna, taking in the mining towns of that district. The Chartiers and Southern railroad now under construction will connect with the Pennsylvania system at Marianna and run north from that point through Carnegie to Pittsburgh. Another branch extends from Pittsburgh across the county to Washington, where it connects with the Waynesburg and Washington Railroad, the latter railroad continuing south to Waynesburg. The Pennsylvania Railroad from Pittsburgh to Steubenville, Ohio, and the west, crosses the northern part of the county. The Pittsburgh and West Virginia Railroad crosses the county parallel and a few miles south of the latter railroad. The Baltimore and Ohio Railroad from Pittsburgh enters the county near the northeastern corner and runs through Washington and Claysville to the western boundary of the county.

Monongahela River offers another means for the transportation of the coal mined in the river district. A large part of the yearly production is loaded in barges destined to points along Ohio River.

Washington County has many miles of improved roads and a great many good dirt roads that are used extensively for the transportation of coal to railroad sidings and to local consumers.

The many transportation routes, the excellent quality of the coal, and its proximity to a ready market have combined to make Washington County a large contributor to the fuel supply.

Washington County is a maturely dissected region. The surface is hilly. The streams have eroded their valleys to a fairly uniform grade and their numerous small branches have cut the uplands into narrow ridges and hills with gentle slopes. Elevations in the county range from 800 to 1500 feet above tide, but points above 1300 feet are rare.

#### STRUCTURE.

Structure contours have been drawn on the base of the Pittsburgh coal. The datum is mean sea level.

There are eleven major structural features in the county, all of which have a direct effect upon the position and mining of the coals. The features having a general northeast-southwest trend are: Bellevernon anticline, Waynesburg syncline, Amity anticline, Nineveh syncline, Washington anticline, Finney syncline, Claysville anticline, and West Middletown syncline. The Cross Creek and McMurry







synclines cut across the West Middletown and Nineveh synclines almost at right angles in the northwest part of the county. The Pan Handle trench, in the vicinity of Bridgeville in the northeastern part of the county, is another peculiar local structural feature.

The Bellevernon anticline is an important structure in eastern Washington County. Where it enters the county at the extreme southeastern corner the Pittsburgh coal has an altitude of 840 feet. The axis rises rapidly toward the north and the Pittsburgh bed has an altitude of 1,000 feet one mile north of Pike Run. The fold increases slowly in height to the south branch of Maple Creek where a sharp dome marks the greatest development of the structure, with the Pittsburgh bed at an elevation of 1060 feet. The axis plunges irregularly to the northeast and at the mouth of Maple Creek the Pittsburgh coal has an altitude of 1,000 feet.

The Waynesburg syncline is a broad structural trough lying northwest of the Bellevernon anticline. The dips are gentle, being on the average less than 100 feet per mile, and the bottom is broad and flat. At the Greene County line the Pittsburgh coal has an elevation of less than 400 feet, but it rises gradually northeast to about 700 feet above sea on Pigeon Creek.

The Amity anticline crosses the county from the south center to the northeast corner, and is a broad structure with gentle dips on both flanks. The Pittsburgh coal rises from an elevation of 450 feet on Ten Mile Creek to a maximum of 1040 feet in the Peters Creek region.

The Nineveh syncline, which enters the county close by the Waynesburg railroad and leaves it just west of the Chartiers railroad, is a shallow trough having an average width of 9 miles. The axis varies much in elevation. Near Conger the Pittsburgh coal has an elevation of about 350 feet; northeast in the vicinity of Gambles, it rises to 700 feet and reaches a maximum elevation of 1040 feet along this axis at Houston.

The Washington anticline extends from the Chartiers Creek district southwest into Greene County. The northern part of the structure is broad and flat, with the Pittsburgh coal at elevations of 950 to 1050 feet along its axis. The axis changes greatly in elevation, especially in the southwestern part of the county, forming a series of domes. The eastern flank dips rather sharply into the Nineveh syncline; the western flank has a gentle dip toward the Finney syncline.

The Finney syncline extends from the town of Washington to the southwestern corner of the county. It is broad and irregular on the south and rises and narrows rapidly to the northeast. It is composed of a series of troughs along a common axis.

The Claysville anticline enters the county about two miles north of the southwestern corner and extends in a general northeast direction to a few miles north of Gretna. This anticline is







practically a continuous chain of alternating domes and saddles which vary greatly in elevation, width, and depth.

The West Middletown syncline enters the county a few miles south of Buffalo Creek and trends northward to Murdocksville. The east-west structure has broken the syncline into a series of basins which have rather high, and in the most part, very regular dips.

The Cross Creek syncline originates near the town of Cross Creek and extends eastward to the Nineveh syncline. This minor structure forms one of the basins on the axis of the West Middletown syncline. The dips on both its flanks are gentle. Its axis varies greatly in elevation.

The McMurry syncline, a minor structure, originates in a low depression of the Nineveh syncline near Morganza, and extends east to the county line. The dips on both flanks are gentle and regular, and its axis rises northeastward.

#### STRATIGRAPHY.

The outcropping rocks of Washington County are river alluvium, the Carmichaels formation of Quaternary age, and the Greene, Washington, Monongahela, and Conemaugh formations of Carboniferous age. The thickness of outcropping consolidated rocks is about 1190 feet.

Drill holes have reached below the Catskill formation of Devonian age, but no workable coal beds were recorded below the Allegheny formation.

The Carmichaels formation is found on terraces along river valleys. It is composed of unconsolidated deposits of gravel, sand, clay and silt. The youngest deposits in the county are the sand and silt deposited by the streams during times of high water. Their thickness varies from a few feet along the smaller streams to 40 feet along Ohio River. The flood plains are a few feet to a mile wide.

The Greene formation has been eroded from large areas in the northern part of the county; in the southern part where some areas remain practically intact, its total thickness is about 350 feet. No coal beds of commercial importance are found in this formation, which is chiefly composed of shales, thin sandstones, and limestones.

The Washington formation has a maximum thickness of 400 feet in the county. Its average thickness is much less. It is composed of soft shaly sandstones, shales, a few thick limestones, and two workable coal beds.







The Monongahela formation is the most important coal-bearing formation in the county. It is composed of sandstones, shales, limestones, and three workable coal beds, one being the Pittsburgh.

The outcrop of the Conemaugh formation is limited to the stream valleys in the northern part of the county. The formation is about 550 feet thick, and is composed of gray or greenish shale, sandstone, thin limestones, and a number of unworkable coals.

The Allegheny formation does not outcrop in the county, but its characteristics are known from drill records. It is composed chiefly of sandstones, shales, coal beds, and thin limestones, and has an average thickness of 275 feet. Two mineable coals of variable thickness have been recorded in a few drill records.

### COALS.

The coals of the Allegheny formation in Washington County are far below the surface and do not outcrop. The information concerning them is based entirely on data obtained from drill records. These data are limited and inadequate since most of them are from churn drill records that do not give a section of the coal passed through, and the drillers, who are primarily concerned with oil and gas horizons, often fail to record coals.

Two coals of workable thickness have been noted in drilling, one at the approximate horizon of the Freeport coals, and the other at the horizon of the Kittanning group of coals. At present this Survey has little information as to their thickness and persistence. Rumors among the coal fraternity would indicate that the large companies, who have bought up considerable acreages in the county, are counting these coals as a reserve for future use. This is quite possible, for a locality containing the Allegheny formation usually has at least one valuable coal, and may have several. Again, these coals are important in adjoining areas, and it is unlikely that all of them would become thin and unmineable within a few miles.

Harlem Coal. This bed lies just below the Ames limestone in the Conemaugh formation. It outcrops in the extreme northwest part of the county, with a thickness of 18 inches. It is geologically the lowest coal outcropping in the county.

A local bed lying 15 to 30 feet above the Ames limestone, is 3 feet thick near Murdocksville, and has been opened in several places.

Little Clarksburg Coal. This bed is locally mineable in the northwest part of the county, where it is known as the Bavington coal, because of its exceptional thickness at that place. In a small area southwest of Frankfort also it is thick enough for mining. The coal is dirty and very lenticular.

Pittsburgh Coal. This bed is the best known, most valuable, and most persistent bed in Washington County. It has a total







thickness, including clay and shale partings, of 4 to 12 feet, averaging about 5 feet. It is divided into four or five benches by clay or shale partings. Where the thickness is greatest, the bed carries many partings. Over much of the area a rider bed having a thickness from 6 inches to 7 feet occurs above the main bed. The main bed is 4 to 7 feet of good clean coal. Along Monongahela River the Pittsburgh bed is a coking coal; between the river district and the Pidgeon Creek district it is a good gas coal. West of this gas coal belt it is a fine steam coal.

The Pittsburgh coal underlies nearly all the county, and is lacking only in a small area in the northwest part, and in a few stream bottoms. The outcrop is limited almost entirely to Hanover, Smith and Robeson townships in the northwest, and the townships bordering on the Monongahela. In these townships mining is done by drift and slope; in the rest of the county, where the coal is several hundred feet below the surface, mining is done by shaft. The bed is double almost everywhere, the roof and lower division being separated by a clay or shale parting, varying from a few inches to several feet in thickness.

The roof division is seldom clean enough to mine. It varies in thickness, and carries many partings in addition to several inches of bituminous shale at the top. This division usually consists of two benches, separated by clay; locally this clay thins and many alternating layers of impure shale and coal take its place.

In the river district the lower division of the bed is 3 to 10 feet thick, divided by three persistent bone partings into four benches, namely, the "Breast" coal, the "Bearing-in" coal, the "Brick" coal, and the "Lower Bottom" coal. In the remainder of the county, particularly in the west, the small parting between the "Brick" coal, and the "Lower Bottom" coal is lacking. A few inches of "draw slate" comes in over the "Breast" coal.

The "Breast" coal is the most regular and valuable bench of the lower division.

The "Bearing-in" coal is thin and soft, and falls into slack on mining. It is often entirely discarded.

The "Brick" coal is of good quality, averages over one foot thick and mines out in brick-shaped blocks.

The "Lower Bottom" coal is not always a distinct bench, and is mined with the "Brick" coal. The coal in this bench is inclined to be dirty, and rather high in ash and sulphur.

Redstone Coal. This bed is unimportant in the county, and except in a few townships along Monongahela River, nowhere is thick enough to mine. In the vicinity of Hackett and Finleyville it has been opened in many country banks, and has a maximum thickness of 3 feet 4 inches. In Scotts Hollow, on Pidgeon Creek, it has been mined in two benches 18 and 21 inches thick. Above Lock No. 4, on







the Monongahela, the coal is often 4 feet thick, and is of excellent quality. Just above Black Diamond mine, along the Monongahela in Carroll township, its thickness is 2 to 3½ feet; near the mouth of Mingo Creek the bed has a regular thickness of 4 feet.

The Redstone coal has good quality in this region, and is second in importance to the Pittsburgh bed. The percentage of fixed carbon is high, the volatile matter is medium, and the ash and sulphur content only slightly exceeds that of the Pittsburgh coal.

Sewickley Coal. This bed, lying from 100 to 130 feet above the Pittsburgh coal, is only locally mineable in Washington County. It has a maximum thickness of 2 feet 4 inches of clean coal on Mingo Creek.

Uniontown Coal. This bed lies about 225 feet above the Pittsburgh coal, and is not of commercial importance at present, as it never exceeds 20 inches in thickness.

Waynesburg Coal. This coal varies between 290 and 350 feet above the Pittsburgh bed. It is a valuable domestic supply in regions where the Pittsburgh bed does not outcrop, although its quality is not as good as the latter bed. The Waynesburg coal commonly is divided into three benches by thick clay partings. Usually the middle bench is mined, the top bench being dirty, and the lower bench generally too thin. The top bench varies from 3 inches to 2 feet in thickness; a 12 to 18 inch clay parting separates it from a middle bench varying from a few inches to 3 feet thick. The lower bench is commonly 15 to 30 inches thick, with a maximum of 4 feet 4 inches. It is separated from the middle bench by a few inches of clay. The Waynesburg bed is a hard block coal of no coking value; its ash varies from 10 to 20 percent, and its sulphur from 2 to 5 percent.

In the northern and western parts of the county the coal is variable in thickness and carries partings which make it practically useless. The coal is thickest in Donegal and Hopewell townships, on Buck, Dunkle, and Hayon runs, and in the vicinity of Acheson. Farther north the coal becomes progressively thinner until it is only a blossom in the northeast part of Canton township, and the southwest part of Chartiers township. The coal is seldom mentioned in well records south of this outcrop. In the eastern part of the county the Waynesburg coal varies from a slight blossom to 7 feet in thickness. Northeast of Scenery Hill the bed is 5 feet 2 inches thick, of which 18 inches is clay and shale. The coal has been mined extensively on Pike Run and its tributaries, where it averages 5 feet 6 inches thick. At Bentleyville, where the Pittsburgh bed is not available, the Waynesburg coal has been used as domestic fuel. It has an average thickness of nearly 6 feet, but is badly parted with clay. In Fallowfield and Carroll townships the reported thickness is 4 feet, including partings. On Krebs Knob, west of Browns-ville the coal is 3 feet 6 inches thick. At the head of Lillys Run the bed is double; a top bench 19 inches thick is separated from the lower bench, which is 2 feet thick, by 3 inches of clay. The coal carries much sulphur.







Waynesburg "A" coal. This bed has been opened in a few places for domestic fuel. Its thickness in most places is less than 12 inches, although it locally reaches a maximum of 3 feet 1 inch in the eastern part of the county. The coal is very dirty and is associated with many feet of bituminous shale.

Little Washington Coal. This bed is a hard block coal free from partings. Its thickness is rarely over 12 inches, and it is never mineable.

Washington Coal. This bed is mineable in many townships, but its value is greatly lessened by the presence of many clay partings. In the northwest part of the county it is between 4 and 8 feet thick, but is very impure. The upper part of the bed is made up of several feet of alternating layers of clay and coal; the lower part is a bench of coal 2 to 3 feet thick. This bed is the most important one outcropping in the western part of the county, where its average thickness is 5 feet 6 inches. The upper part of the bed is composed of alternating layers of coal and shale; the lower part is a good coal 2½ to 3 feet thick. The coal is not important in the eastern part of the county. In a railroad cut just west of Washington the bed is 7 feet 1 inch thick, but carries several partings. Locally, the coal equals the Waynesburg in value as a domestic fuel.

The coals above the Washington bed are not thick enough for mining, and will not be described in this bulletin.





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